REMARKS/ARGUMENTS

Claims 1-7, 9-15, and 17-21 are currently pending in this application. Claims 8, 16 were cancelled by previous amendment. No claims are amended or added by this amendment.

Statement of the Substance of Telephone Interview Conducted on August 10, 2009

Applicant thanks the Examiner for conducting a telephone interview on August 10, 2009. Although the Examiner did not have authority to reach any agreement or make any commitments, agreement was reached that the telephone interview was helpful in facilitating an understanding the novel aspects of the claimed invention. Applicant agreed to respond to the final rejections in writing, setting forth again the distinctions in the claimed invention over the applied references.

Reconsideration Is Requested of the Claims Under Rejection

As discussed during the telephone interview, Fujimori does not disclose a multi-level quantizer having at least three discrete quantization levels, each of the discrete quantization levels being represented by a set of corresponding symbols, each symbol comprises a number of one signs, **the number of one signs being *proportional* with a magnitude of the transducer signal** represented by the corresponding multi-bit sample.

As explained in response to the previous office action, the claimed invention proposes a novel quantization scheme that is arguably less efficient in some respects compared to prior-art quantization techniques, but is simple and can be implemented with a minimum of logic circuitry and therefore represents a very attrractive option for low-power applications like hearing instruments and mobile phones. Application, Paragraph [0039]. The quantization scheme represents each quantization level by a symbol having logic 1s and 0s, where the number of one signs (1s) in the symbol is proportional to the magnitude of the analog signal. The location and order of the one signs in the symbol can be ignored because it only matters *how many* one signs are in each symbol, not their oder and location. To recreate the original signal, the receiving circuitry only has to count the number of ones in each symbol to determine the corresponding magnitude for that sample.

There is nothing in Fujimori that suggests this novel quantization scheme. Fujimori's multi-bit modulator 16 produces a multi-bit output "using a multi-bit quantization technique."

Conventionally, this technique is carried out using a two's complement format. Thus, for example, a first quantization level for a 4-bit quantizer would be encoded as {0001}, whereas a second quantization level would be encoded as {0010}. Both the first and second quantization levels have a single one-sign, but it is the *order* or location of the one sign in each symbol that determines the quantization level, not the number of one signs. The magnitude of the encoded analog signal is not proportional to the number of one signs in the symbol (two distinct quantization levels each has a single one-sign). By contrast, in the claimed invention, the order and location of the one signs is irrelevant because the number of one signs is used to represent the quantization level.

The Examiner pointed to column 6, lines 3-5 of Fujimori, which provides "Digital signal 14 is a serial stream of 1s and 0s, the relative quantity of which is dependent upon the magnitude of the analog signal 12." Although the digital signal 14 is not shown in FIG. 1, Fujimori appears to be referring to the output of the **one-bit** digital delta-sigma modulator **18**, and not to the output of the **multi-bit** analog delta-sigma modulator **16**. As Applicant's representative mentioned on the telephone, the Examiner is relying upon the **multi-bit** modulator **16** as corresponding to the claimed "multi-level quantizer," and clearly the output of this multi-bit modulator 16 does not have quantization levels represented by symbols, each symbol having a number of one signs, the number of one signs being proportional with the magnitude of the analog transducer signal. The multi-bit output from the multi-bit analog modulator 16 is then passed through a **one-bit** digital delta-sigma modulator **18**, which produces the digital signal 14 shown as a 1-bit digital signal output in FIG. 1. The **multi-bit** modulator **16** is shown in two different embodiments in FIGS. 7 and 8 of Fujimori. *See* Col. 7, l. 52 to col. 8, l. 18. Thus, for example, an encoded digital value of "5" changes to an encoded digital value of "6" to indicate an incoming analog signal magnitude that is increasing. In a 4-level quantizer, the value of 5 would be represented in two's complement by {0101} and the value of 6 would be represented in two's complement by {0110}, and both of these digital words have two one-signs each. As a result, the magnitude of the analog signal would not be proportional to the number of one signs in the signal, and there would be no way to differentiate among a level 5 from a level 6 or from a level three {0011} or a level 12 {1100}or a level 9 {1001} as all of these levels contain two one-signs.

Applicant emphasizes that the output of the **multi-bit *analog*** modulator **16** is then passed to a "well known" (col. 8, l. 55) **one-bit *digital*** delta-sigma modulator **18**, which "simply

converts the accumulated digital values into a bit stream having a number of 1s and 0s that correspond to that accumulated value." Col. 8, ll. 60-62. Applicant also emphasizes that the Examiner is correctly not relying upon (and cannot rely upon) this one-bit digital delta-sigma modulator 18 as corresponding to the claimed multi-level quantizer. There is nothing in Fujimori that teaches or suggests the encoding scheme in the multi-level quantizer as claimed in which the number of one signs for a given sample is proportional to the magnitude of the analog signal.

Thus, for at least the foregoing reasons, Applicant requests reconsideration of the rejection based on Deruginski in view of Fujimori. Fujimori's multi-bit quantization technique follows prior-art techniques that use two's complement to represent a magnitude value of a sampled analog signal, and Fujimori does not teach or suggest a quantization scheme in which the number of one signs is proportional to the magnitude of the analog transducer signal as claimed. Accordingly, Applicant respectfully submits that the Examiner has not made out a *prima facie* case for obviousness, and the rejection cannot stand.

Applicant also pointed out during the telephone interview another distinction in the claimed invention; namely, that the Deruginski-Fujimori combination fails to teach or suggest a "digital signal converter adapted to convert the multi-bit samples into an **unformatted** single-bit output signal." As pointed out in a previous response, Fujimori's multi-bit analog modulator 16 produces a *formatted* multi-bit data stream (e.g., in SACD format) that can be coupled to a digital system, for example, a super audio CD (SACD) unit. Col. 6, ll. 52-65; *see also* col. 3, ll. 30-49 (also discussing PCM audio formats for DVD audio discs). By contrast, an *unformatted* output advantageously allows the claimed digital microphone to be easily incorporated into a host of different audio systems, such as hearing instruments, mobile phones, headsets, and so forth, which may use different audio formats. The claimed digital microphone is not designed for use in any particular digital audio system; its generic, unformatted output can be easily incorporated into any digital audio system, which can convert the unformatted output into whatever formatted audio format is required by that system.

Therefore, because Fujimori's one-bit digital modulator 18 outputs a *formatted* signal, whereas the claimed digital signal converter produces an *unformatted* single-bit output signal, claim 1 is believed to be patentable over the Deruginski-Fujimori combination for at least this

additional reason. The same remarks above that apply to claim 1 also apply, *mutatis mutandis*, to claim 15, the other independent claim under rejection.

The Finality of the Office Action Should be Removed

Although Applicant believes that the pending claims are in condition for allowance, should the Examiner be inclined not to issue a notice of allowance, Applicant respectfully submit that the next office action should not be made final to the extent that the Examiner agrees that the Deruginsk-Fujimori combination fails to render the claims unpatentable. Should the Examiner maintain his rejection based on the Deruginski-Fujimori combination, Applicant requests that the Examiner clearly explain and point out in the Advisory Action how Fujimori teaches the claimed quantization scheme in which the number of one signs in each symbol is proportional with a magnitude of the transducer signal, so that a clear record can be presented on appeal.

Conclusion

It is the Applicant's belief that all of the pending claims are in condition for allowance and action towards that end is respectfully requested. If any matters may be resolved or clarified through a telephone interview, the Examiner is respectfully requested to contact the Applicant's undersigned attorney at the number shown.

It is believed that no fees are due; however, should any additional fees be required (except for payment of the issue fee), the Commissioner is authorized to deduct the fees from Nixon Peabody LLP Deposit Account No. 50-4181, Order No. 247161-000047USPX.

Respectfully submitted,

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